



ELMWOOD PARK, NJ
NEW YORK, NY
MIAMI, FL
W. PALM BEACH, FL

SDMS Document



68030

Rec'd 7/5/89

**Langan
Environmental
Services, Inc.**

River Drive Center 2
Elmwood Park, NJ 07407
(201) 794-6969

2 Penn Plaza, Suite 1500
New York, NY 10121
(212) 432-7885

29 June 1989
2027001

**Ms. Janet Feldstein
USEPA Region II
26 Federal Plaza
New York, New York 10278**

Dear Janet:

Enclosed is a letter sent to me by Dames & Moore in response to Mr. Rooney's letter of 24 April 1989 concerning groundwater flow at the SCP Carlstadt site. If you have any questions, please call.

Very truly yours,

LANGAN ENVIRONMENTAL SERVICES, INC.

Donald J. Murphy

Donald J. Murphy
Facility Coordinator

DJM:mg
Enclosure

cc: Mr. W.L. Warren - CSPS&C

004331



DAMES & MOORE

12 COMMERCE DRIVE, CRANFORD, NEW JERSEY 07016-1101 (201) 272-8300

June 29, 1989

Donald J. Murphy, Ph.D.
Langan Environmental Services
River Drive Center #2
Elmwood Park, New Jersey 07407

Re: USEPA letter dated April 24, 1989
Scientific Chemical Processing (SCP) site - Carlstadt, NJ.
Administrative Order Index No. II CERCLA - 50114 ("the Order")

Dear Don:

At the request of Mr. William L. Warren, common counsel to the SCP Carlstadt group, we reviewed the referenced letter, in which the EPA expressed concern about Dames & Moore's interpretations of ground water flow patterns at the SCP site, as discussed at a meeting with the Agency on April 14, 1989. The following information is provided to clarify our technical position regarding the ground water flow regime.

Now that the proposed work of POP Revisions 7, 8 and 9 is completed, the newly acquired data confirm our initial assessment of the ground water flow regime and allow us to further refine our understanding of the hydraulics of the water table aquifer. These data indicate that:

- 1.-The horizontal ground water flow direction in the water table aquifer is radial away from the site;
- 2.-There is a downward vertical hydraulic gradient both on-site and the near-site vicinity, from the water table aquifer down toward the underlying aquifer units.

004332



Don Murphy, Ph.D.

June 29, 1989

Page - 2 -

Based on permeability and hydraulic head values computed from data collected during POP Revisions 7, 8 and 9 we were able to estimate the average annual volume of ground water flowing out of the water table aquifer.

By using Darcy's law:

$$Q = K h i W$$

where:

Q= horizontal ground water flow rate

K= horizontal permeability

h= saturated thickness

i= horizontal hydraulic gradient

W=linear width of aquifer zone,

the flow or flux across each site boundary line can be estimated:

	Est. Average Permeability (ft/yr)	Est. saturated Thickness (ft)	Est. Average Gradient	Width (ft)	Groundwater Flux (ft ³ /yr)
NE Boundary	2,000	1	0.02	545	22,000
SE Boundary	7,500	6	0.001	375	17,000
SW Boundary	4,400	6	0.001	400	11,000
NW Boundary	200	10	0.015	400	12,000

By adding up the estimated horizontal flux across the four boundaries, the total estimated lateral ground water flux is 62,000 ft³/yr.

The permeability of the silt and clay unit that separates the water table from the

004333



Don Murphy, Ph.D.

June 29, 1989

Page - 3 -

till aquifer ranges from 3.86×10^{-6} to 4.35×10^{-8} cm/sec (Table 5, RI Report September 19, 1989). The vertical gradient as measured at wells MW-2D, MW-5D and MW-7D ranges from about 0.3 to about 1.0. Using a mean vertical permeability of 1×10^{-7} cm/sec, a mean vertical gradient of 0.5 and a site area of 6 acres, the computed vertical groundwater flux is 13,600 ft³/yr.

Throughout the course of the remedial investigation Dames & Moore has consistently aimed to establish the geohydrologic relation between the water table and the till aquifers. As stated in the Work Plan for the SCP Site (p.29 - dated October 1, 1985): "The surficial zone is reported to be underlain by a layer of low permeability lacustrine silty clay which would act as a barrier to contaminated water migrating downwards to the bedrock aquifers. ... This hypothesis should be verified by appropriate hydrogeologic investigations, including : a) separate monitoring wells in the shallow fill zone and in the glacial till layer (or bedrock); and b) permeability testing of the clay layer." Therefore, the potential for a vertical component of ground water flow between the water table and the till aquifer has been recognized since early in our investigation. Subsequent POP Revisions were developed by Dames & Moore and approved by the Agency to supplement the initial investigation and to further evaluate the horizontal and vertical organic chemical compound distribution, geohydrologic conditions and potential for organic chemical compound migration.

In the Draft RI Report to the USEPA, dated September 19, 1988, we discussed the relationship of the potentiometric levels in the till and the water table aquifer. It is stated there, that "the elevation of the piezometric surface (of the till aquifer) is approximately 10 to 15 feet lower than the surface of the water table aquifer, indicating a downward gradient between the two aquifers." The concept of a vertical flow regime, as described in the Draft RI Report to the USEPA, dated September 19, 1988, was brought forward in the "Public Health Assessment" (Table 3-1) and in the Feasibility Study (p.1-13, dated April 5, 1989) and was taken into consideration wherever it was appropriate or necessary to guide the Public Health Assessment, the Feasibility Study and the planning of additional investigations. Nothing in the aforementioned documents depended on the bulk of the ground water in the water table aquifer flowing in a particular direction. While we utilized the vertical flow regime hypothesis in this



Don Murphy, Ph.D.

June 29, 1989

Page - 4 -

evaluation, we recognized the need for further evaluation. As stated in the Draft RI Report (p.52 - dated September 19, 1988), "work is planned to provide additional hydrogeologic data. Once these data are obtained, ground water flow patterns will be reevaluated based on on-site and off-site data points. *The enlarged data base will be used to confirm previous interpretations or result in their modification*" (emphasis added).

Prior to issuance of the Draft RI Report, information pertinent to the ground water flow regime was presented to the Agency at a February 5, 1988 meeting in Trenton, New Jersey. At that time the Agency apparently accepted the information on the vertical flow, but questioned the interpretation of the horizontal flow direction in the water table aquifer. To resolve this question POP Revision 7 was developed and submitted to the Agency, approved and implemented. The scope of work included the installation of ten piezometers in the water table aquifer. Subsequently, to refine the findings of POP Revision 7 and derive a better understanding of the ground water flow regime off-site vicinity, POP Revision 8 was submitted to the Agency, approved and implemented. Furthermore, given our questions about the vertical gradients and the potential for vertical migration of organic chemical compounds, POP Revision 9 was submitted and implemented, to evaluate ground water quality in the bedrock aquifer and to assess the potential for hydraulic connections between the different aquifer units. These plans further demonstrate our consistent approach in evaluating the vertical component of ground water flow at the site.

We hope that this discussion will help clarify any questions that the Agency may have regarding the ground water flow regime. Please do not hesitate to contact us if you have any questions.

Very Truly Yours

Dames & Moore


James G. McWhorter

Project Manager

004335